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PROGRAMME OF STUDIES FOR THE HIGH SCHOOL

Bulletin 1

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1940

MATHEMATICS

GENERAL MATHEMATICS

The courses in General Mathematics are offered to meet the needs of students whose special aptitudes or interests do not lie in the field of Mathematics, but for whom, nevertheless, some knowledge of fundamental mathematical concepts and the application of these to practical situations of life will be of value. It is also a necessary course for students entering the senior high school with "C" standing from Grade IX, who desire ultimately to proceed with academic rather than with general subjects, and who can therefore profit from remedial work in Mathematics before undertaking the courses in Algebra 1 and Geometry 1.

To meet the needs of such a divergent group of students, the courses in General Mathematics must contain a wide variety of topics from which the teacher may select those most appropriate to the needs of his class. He may give the course a commercial, technical or academic "bias." He may "dilute" the course if he finds it too difficult for his particular class. It is fundamental that the teacher decide early in the school year the particular bias the class will follow and treat the course accordingly.

The "integration" that distinguishes a course in General Mathematics from the older courses in specialized subject-matter is to be sought not so much in the content as in the classroom procedure for applying this content in a practical way to the solution of problems on which the student is working. **It cannot be stated too emphatically that the teacher is not required to "cover" any prescribed minimum or core of work. The really important thing is that students be kept working at optimum efficiency throughout the year on meaningful problems which have some practical interest for them. The aim is not to enforce a standard but to increase the students' understanding and practical efficiency.**

THE TEACHER IS ASKED TO NOTE THAT IN GENERAL MATHEMATICS STUDENTS SHOULD BE ENCOURAGED TO USE IN EACH PROBLEM, WHETHER ALGEBRAIC, GEOMETRIC OR TRIGONOMETRIC, THE MOST USEFUL METHOD OF SOLUTION AVAILABLE.

Vocabulary

Teachers are reminded that some time should be devoted to helping students master the spelling and meaning of all new words belonging to the technical vocabulary of Mathematics. For example, such words as adjacent, alternate, altitude, complementary, diagonal, hypotenuse, intersect, inscribe, directed, number, equation, factor, formula, index and indices, Pythagoras, symbol and linear, should be mastered by the student. Teachers are expected to prepare their own vocabulary checklist and to make use of such a list during the work of the term.

Oral and Written Expression

The attention of teachers is also directed to the fact that oral and written expression in English are to be considered as an important part of every course, and especially of Social Studies, Mathematics and Science. In no subject is correct and accurate expression of more importance than in Mathematics.

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List of Reference Books

No single textbook can be prescribed that will be adequate for the needs of all types of student in this subject. It will therefore be necessary that every classroom for General Mathematics be equipped with a classroom library of reference books in which suitable material can be found for class work.

Such a library should include all books which the teacher has found to be useful and, in addition to these, half a dozen at least chosen from the following list. This list of reference books is numbered, and in the outline which follows it, reference is usually made to the number as it appears on this list, but not to the title of the book. Following the numbered list is a further list of reference books which teachers may find useful for special purposes.

1. BUSINESS ARITHMETIC: Thompson—Prentice-Hall.
2. ESSENTIALS OF BUSINESS ARITHMETIC: Kanzer & Schaaf —D. C. Heath.
3. MATHEMATICS FOR TECHNICAL SCHOOLS: Warren & Rutherford (1935 Edition)—Copp Clark.
4. PRACTICAL MATHEMATICS: Palmer—McGraw-Hill Book Co. Part IV: Trigonometry and Logarithms.
5. PRACTICAL GEOMETRY: Siddons & Hughes—Cambridge University Press (Macmillan Co.).
6. A COMMERCIAL ARITHMETIC FOR SECONDARY SCHOOLS: Batstone—Ryerson Press.
7. MATHEMATICS FOR TODAY: LaZerte and Betz—Ginn & Co.
8. ALGEBRA FOR TODAY: Betz, Robinson and Shortliffe—Ginn & Co.
9. FUSION MATHEMATICS: Freilich, Shanholt and McCormack—Silver-Burdett.
10. THE D. U. TECHNICAL SERIES—ARITHMETIC FOR ENGINEERS: Clapham—E. P. Dutton & Co.
11. FIRST YEAR ALGEBRA: Hawkes, Luby and Touton—Ginn & Co.
12. MATHEMATICS FOR MODERN LIFE: Joseph P. McCormack—Appleton-Century Co. (Ryerson Press).
13. ARITHMETIC OF BUSINESS: McMakin, Marsh & Baton—D. C. Heath.
14. FIELD WORK IN MATHEMATICS: Shuster-Bedford—American Book Co.
15. APPLIED MATHEMATICS FOR GIRLS: Bruce Publishing Co., Milwaukee.
16. PLANE TRIGONOMETRY: Conant—American Book Co.
17. FUNDAMENTALS OF STATISTICS: Thurstone—Macmillan Co.
18. PRACTICAL MATHEMATICS: Horace Wilmer Marsh—John Wiley & Sons. Vol. IV: Technical Trigonometry.
19. PLANE TRIGONOMETRY AND APPLICATIONS: Wilczynski & Slaught—Allyn & Bacon.
20. PLANE TRIGONOMETRY: Reed—G. Bell & Sons.

21. EXCURSION IN MATHEMATICS: E. R. Breslich—Orthovis Company, Chicago.
22. MATHEMATICS IN DAILY LIFE: Barker and Morgan—Houghton Mifflin Co.
23. ALGEBRA FOR USE: Mathematics for Junior High Schools, Book Three—John C. Winston Co.
24 THE CONSUMER INVESTIGATES: ZuTavern & Bullock—Commercial Textbook Company, South Pasadena, California.
25 MECHANICS FOR THE UPPER SCHOOL: Merchant and Chant—Copp Clark Co.
26 ESSENTIALS OF ALTERNATING CURRENT ELECTRICITY: Timbie and Higbie—Wiley
27 MATHEMATICS FOR ELECTRICAL STUDENTS: Keal and Leonard—John Wiley and Sons, Inc.
28 GENERAL MATHEMATICS, BOOK I: Jackson, Dean and Crawford—Macmillan Co.
29 GENERAL MATHEMATICS, BOOK II: Lougheed and Workman—Macmillan Co.

Additional Reference Books

PRACTICAL MATHEMATICS: Palmer—McGraw-Hill Book Co.
Part I: Arithmetic with Applications.
Part II: Algebra with Applications.
Part III: Geometry with Applications.

PRACTICAL MATHEMATICS: Horace Wilmer Marsh—John Wiley & Sons, N.Y.
Vol. I: Industrial Mathematics.
Vol. II: Technical Algebra.
Vol. III: Technical Geometry.

Vol. I has some good material on practical applications. Vol. II gives a good treatment of variations, logarithms and the slide rule.

NEW PLANE GEOMETRY: Stone-Mallory—Benj. H. Sanborn & Co.

NEW SOLID GEOMETRY: Stone-Mallory—Benj. H. Sanborn & Co.

PLANE GEOMETRY (Life Interest Series): Sykes, Comstock and Austin—Rand-McNally Co.

SOLID GEOMETRY (Life Interest Series): Sykes, Comstock and Austin—Rand-McNally Co.

PLANE GEOMETRY: Strader & Rhoades—John C. Winston Co.
(The five books on Geometry just mentioned give some excellent suggestions for creating interest in Geometry by showing its practical applications to activities of everyday life.)

Teachers' Professional Reference Books

THE TECHNIQUE OF TEACHING SECONDARY SCHOOL MATHEMATICS: Breslich—University of Chicago Press.

THE TEACHING OF ELEMENTARY ALGEBRA: C. V. Durrell —G. Bell & Sons.

FUNDAMENTAL SKILLS OF ALGEBRA: J. P. Everett—Teachers College, Columbia University.

THE TEACHING OF ELEMENTARY MATHEMATICS: Godfrey and Siddons—Macmillan Co.

THE TEACHING OF SECONDARY MATHEMATICS: Hassler and Smith—Macmillan Co.

ENRICHED TEACHING OF MATHEMATICS IN HIGH SCHOOLS: Woodring and Sandford—Teachers College, Columbia University.

SIXTH, SEVENTH, EIGHTH, TENTH and ELEVENTH YEARBOOKS OF THE NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS: Bureau of Publications, Teachers College, Columbia University, New York. (The Sixth Yearbook deals with Mathematics in Modern Life.)

THE TEACHING OF GEOMETRY IN SCHOOLS: A Report prepared by the Mathematical Association—G. Bell & Sons.

A Second Report on the Teaching of Geometry in Schools prepared by the Mathematical Association—G. Bell & Sons.

MEMORANDA ON TEACHING AND ORGANIZATION IN SECONDARY SCHOOLS—Geometry, Circular 851—Board of Education (His Majesty's Stationery Office, London).

THE REORGANIZATION OF MATHEMATICS IN SECONDARY EDUCATION, Part I: Riverside Mathematical Monograph Series—Houghton Mifflin.

THE TEACHING OF ALGEBRA (INCLUDING TRIGONOMETRY): Sir T. Percy Nunn—Longman's Modern Mathematical Series.

EXERCISES IN ALGEBRA (INCLUDING TRIGONOMETRY) Parts I and II: Sir T. Percy Nunn—Longmans' Modern Mathematical Series.

EXERCISES IN ARITHMETIC AND MENSURATION (WITH DIAGRAMS): T. P. Abbott—Longmans' Modern Mathematical Series.

THE TEACHING OF ARITHMETIC: T. P. Abbott—Longmans' Modern Mathematical Series.

A SCHOOL COURSE IN GEOMETRY: W. J. Dodds—Longmans'' Modern Mathematical Series.

Special Notes to Teachers

1. Teachers should habituate students to the use of mathematical tables for the purpose of minimizing the labour of computation. For the work in logarithms and trigonometry students should be required to obtain a suitable book of tables. **"Mathematical Tables"** by Knott (W. R. Chambers) will be found very satisfactory and may be obtained

from the School-Book Branch. **"Mathematical and Physical Tables"** by J. B. Clark (Oliver and Boyd, London) are also very good and inexpensive. Teachers wishing to use the bar system of logarithms will find no difficulty in the use of these tables, which use the "10" system; e. g. log. tan 5 is given as 8.9420, but this can be converted to $8.9420 - 10 = \bar{2}.9420$.

The Examinations Branch of the Department has for distribution a number of copies of the tables of logarithms reprinted from Stanley and Smith's ARITHMETIC, formerly used in Grade XI. These tables are very useful to stuents of mathematics and may be had from the Examinations Branch postpaid at the rate of two for five cents.

2. Students should be trained to use **graphs** in the solution of mathematical problems wherever the graphs will serve a useful purpose in giving quick approximations as a check on accuracy or in clarifying the students' understanding of a problem.

General Mathematics 1

Each course consists of two Sections, A and B. Section A includes studies and practice suggested as a core for all students. Section B is divided into three parts, the one to be selected depending upon the type of school or of class.

IT IS IMPORTANT THAT THE TEACHER CONSIDER HIMSELF FREE TO TREAT THIS ORGANIZATION OF THE COURSE AS SUGGESTIVE, SUITING THIS PLAN OF WORK TO THE SITUATION WHICH CONFRONTS HIM. Some students may require much remedial work in Section A, others may require little, and there are many optional topics which teachers may well include for the latter group.

No one textbook can be prescribed. It is expected that a considerable number of the books listed for reference will be made available for use in every classroom library. Several of the books listed are used as textbooks in other courses of the high school programme.

Informational and "Socialized" Arithmetic

It is not intended that the work in any class should be wholly computational. Much informational and practical work should be introduced. For example, when teaching the topic "Fire Insurance" in Commercial Arithmetic, the instructor should, after showing how to compute the premium at any given rate, say 95 cents, discuss the different factors affecting the rate—basic rate for any community based on the efficiency of the fire-fighting forces and equipment and the frequency of fires, type of building construction, distance from adjacent buildings, distance from fire hydrants and the purpose for which the building is used. An attempt should be made to have the students answer such questions as the following: "Why is the rate of interest charged to Western farmers higher than that charged to Eastern farmers? Why are Dominion of Canada 4½'s due in 1959 quoted at 112 while Alberta 4½'s due in 1956 are quoted at 57? Why does the rate of interest fluctuate?"

Teachers will find valuable directions on this type of approach to General Mathematics in Chapter IV of "Relation of Social Arithmetic to Computational Arithmetic," by Busell in the Tenth Year Book of

the National Council of Teachers of Mathematics (Teachers College, Columbia University, New York), and in "The Technique of Teaching Secondary School Mathematics," by Breslich (University of Chicago Press). Further remarks on this aspect of Arithmetic will be found in Section B, Division II—ARITHMETIC OF BUSINESS AND OF THE HOME.

Just as in the lower grades the use of "enterprises," projects and activity units has been found necessary for the purpose of motivating the learner, so in intermediate and high school grades **units of work grouped around "centres of life interest" will be much more effective for the purpose of teaching Arithmetic to students of average ability than the traditional categories of the orthodox textbook in Arithmetic.** This point should not be overlooked by teachers who attempt to offer "remedial" instruction in Arithmetic.

SCHEME OF WORK—GENERAL MATHEMATICS 1

Section A:

Division I—Arithmetic (mainly remedial).
Division II—Logarithms.
Division III—Mensuration.

Section B:

Division I—Remedial and Practical Algebra and Geometry.
Division II—Arithmetic of Business and of the Home.
Division III—Algebra and Technical Arithmetic (for Technical students).

Section A

Division I

Remedial Instruction in Arithmetic

Remedial instruction, to be of educative value, must have two important characteristics:

1. Exploration by the teacher of the student's individual patterns and habits of thought and practice for the purpose of straightening out "kinks" that hold up the student's further progress.

2. Avoidance of dreary repetition of "type problems" and meaningless routine.

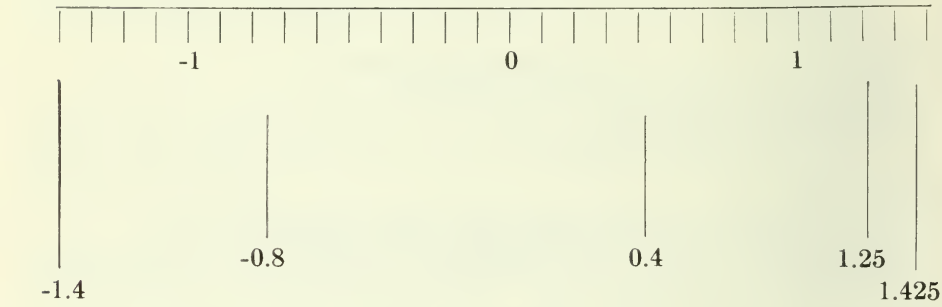
Unless the instruction actually touches the student's difficulty, it will not succeed, no matter how often the exercises are repeated or how many hours are devoted to them. Moreover, a student who is not to be inspired by an array of problems on "percentage" or "bank discount," or the length of time taken by A, B and C working together to do a piece of work, may, after all, find something comprehensible in problems that spring from an attempt to balance the family budget or other problems in the field of his own immediate experience. Many students who require remedial instruction in Arithmetic have had the full benefit of traditional procedures. With such students, it is obviously necessary to try some of the newer procedures.

N.B.—For the following units of Division I, the use of any good textbook in Arithmetic will be satisfactory.

1. Vulgar Fractions. **References.**—No. 3, Chapter I, page 4.
   No. 6, Chapter II.

2. Decimal Fractions, including simple examples of circulating decimals. **References.**—No. 3, Chapter III, page 23.
   No. 6, Chapter II.

3. The meaning of decimal fractions as applied to scales. Practice may be secured in reading radio scales, watt-meter, micrometer scales, verniers, slide-rules. Some stores of the "five-and-ten-cent" type offer vernier-calipers, micrometers, and slide-rules at prices of a few cents. Instruments from the laboratory of the school also offer opportunities for practice in scale-reading, and in making decimal approximations. Curved and non-uniform scales should be included. The teacher and students may construct problems such as the one below:



   It should be emphasized that all measurements are approximations.

4. Changing vulgar fractions to decimal fractions and *vice versa*. **References.**—As above.

5. The Metric System.
   References.—No. 3, Chapter IV, page 45.
   No. 6, Chapter VI.

6. Elementary work on powers and roots including formal method of extracting the square root of numbers, and practice in the use of tables of square roots. Some elementary work on surds such as removing the square factor, addition, subtraction, multiplication and division of simple quadratic surds.
   References.—Knott's Tables.
   No. 7, table on page 351.
   No. 8, pages 170-185.
   No. 6, Chapter VII, and tables, page 332.

7. Ratio—Elementary ideas involved in sharing problems and problems arising from model-building and from enlarging and reducing plans, maps and photographs; trigonometric ratios.
   References.—No. 23, Chapters X and XI.
   No. 7, Chapter XV.
   No. 8, pages 144-150.
   No. 3, Chapter VIII, page 108.
   No. 6, page 56.

8. Percentage.—Review of elementary work. Relation between percentage, decimals and fractions; and a table to show this relation for commonly used percentages. Aliquot parts.
Percentage as a ratio.
Simple problems illustrating common use of percentages.
References.—No. 2, page 20.
No. 6, page 53.

Division II. Logarithms.

The work on logarithms should not be treated as a formal discussion of the theory of logarithms but rather as the use of a tool to eliminate, or at least to minimize, the drudgery of long mechanical arithmetic operations. This work should be taken before mensuration and used freely in the solution of mensuration problems. Practice in the use of logarithms must precede their use in mensuration, but their use must not stop there. In many of the Arithmetic texts formerly used, such numbers as would "cancel" out nicely in the solution were included in the given data. This seldom occurs in practice and should be discontinued in the classroom. Problems should be of a practical nature, and for such problems logarithmic computation is a useful tool.

Logarithms to the base 10 only should be used. A procedure similar to the following has been found suitable for Grade X students:

$10{,}000 = 10^4$ $\quad$ $1/10 = 10^{-1}$
$1{,}000 = 10^3$ $\quad$ $1/100 = 10^{-2}$
$100 = 10^2$ $\quad$ $1/1{,}000 = 10^{-3}$
$10 = 10^1$ $\quad$ $1/10{,}000 = 10^{-4}$
$1 = 10^0$

The logarithm is merely the power of 10 (the base) which produces the number; hence log. $100 = 2$, log. $1{,}000 = 3$, log. $1 = 0$, etc. Since 50 lies between 10 (10^1) and 100 (10^2), log. 50 lies between 1 and 2; that is, it would be 1 plus a fraction; this fraction as a decimal fraction can be found in the table of mantissas, etc.

Finding the antilog can be developed as a reverse of the above scheme.

References.—No. 4.
No. 23, Chapter XV.
No. 3, Chapter XI, page 192.
No. 8, Chapter VIII.
No. 9, Chapter XIII.

Division III. Mensuration.

(a) **Lines.** (1) Perimeters of common geometric figures—rectangle, triangle, circle, etc.
(2) Right-angle triangle.
(3) Arcs of circles.

(b) **Areas.**

(1) Rectangle.
(2) Parallelogram.
(3) Triangle—use of both formulas: $\frac{1}{2}$ bh and $\sqrt{s(s-a)\,(s-b)\,(s-c)}$
(4) Trapezium.
(5) Circle.
(6) Prism, including cylinder.
(7) Irregular surfaces—counting squares, weighing.

(c) **Volumes.** Wherever possible, models should be used for experiment. Solid models may be constructed from potato, clay or wood. These may be immersed in an overflow can, and volume of water displaced may be measured by a graduated tube.

(1) Rectangular solid.

(2) Prisms, including cylinder.

References.—No. 3, pages 82-107; 205-235.
No. 6, Chapters VIII and IX.
No. 23, Chapters IV and VII.

Section B

Division I. Remedial and Practical Algebra and Geometry.

Classes that are not definitely specializing in commercial or technical electives may find the material in this section of value, much of which can be done in connection with mensuration. Students should be encouraged to use the geometric and algebraic ideas obtained from the General Mathematics of Grade IX, and to develop the practical applications of these ideas. Much of the work can be treated as remedial and will therefore be of value to students who desire to proceed in their second year with Algebra 1 or Geometry 1.

1. Positive and negative numbers:
   (a) Their operational (direction-distance) meaning.
   (b) Their positional meaning.

   Note: Few texts treat these topics adequately. Some good material may be found in Reference No. 11.

   (c) Development of simple operations **with** numbers in the extended (positive-negative) range.
      (i) By inferences from illustrations. See Reference No. 7, Chapter V; and No. 23, Chapter V.
      (ii) By arbitrary extensions of operations from the positive to the negative scale.

      Note: This, by all means the easier procedure, is overlooked by nearly all authors. An attempt is made, however, in Reference No. 11.

2. Simple equations and formulae involving one variable.
   References.—No. 8, Chapter I; and No. 23, Chapters I and IX.

3. Problems of a practical nature involving one variable.
   Reference.—No. 12, Chapter 8.

4. Linear equations in two variables with their use in solving simple problems. Solutions of a linear equation in two variables and points on its graph. The two-solution method of drawing the graph. Common point and common solution. Show that the "add and subtract" treatment of two such equations is valid at the common point only. Suitable applications in Reference No. 8, Chapter II.

5. Special products and their factors:
   (a) Common factor.
   (b) Square trinomials.
   (c) Trinomials such as, x^2-5x+b. (by analogy called rectangular trinomials.)
   (d) Difference of squares.

   Reference.—No. 8, Chapter III.

6. (a) Positive integral exponents—their meaning and simple operations with them.
   (b) Roots as inverse of powers. Fractional exponents—to be treated theoretically or as arbitrarily assigned notation in varying degrees in accordance with classroom conditions. Roots to be restricted to rational and a few very simple irrational roots. Reading squares and square roots from the graph of the function x^2. All complicated operations with surds to be omitted. See Reference No. 23, Chapter XII.
   (c) The zero exponent.
   (d) Negative integral exponents—to be treated as an arbitrary notation with such theory as conditions justify. Scientific use of positive integral and negative integral exponents with the base 10, as shown in Reference No. 8, Chapter VI, pages 167 and 168.

The work of Grade IX Geometry should be strengthened and extended, with additional practical emphasis. Reference No. 5 contains ample material for this purpose. The first chapters cover the Grade IX material.

These chapters set forth an abundance of problems, including three-dimensional problems.

The following principles are needed in mensuration:
(a) Locating the centre of an arc of a circle.
(b) The angle in a semi-circle.
(c) Tangents.
(d) The inscribing of a circle in the triangle and square and vice versa.
(e) The rudiments of ratio and similarity.

All these matters are amply treated in the later chapters of No. 5. There are chapters devoted to the prism, cylinder, cone, sphere, etc.

Division II. Arithmetic of Business and of the Home.

The traditional course in Commercial Arithmetic consists mainly of the applications of percentage to business transactions. The course is usually set forth as a series of topics, and the usual procedure has been to illustrate each of these topics by means of a more or less extensive set of graded problems specially selected to illustrate the particular topic under consideration. In some of the older textbooks each set of problems included a number of converse problems which were supposed to provide excellent mathematical discipline for the student.

This older procedure, however, is no longer effective for the majority of high school students who study Arithmetic; and for the reason that

such students do not experience life situations in which the arithmetical problems encountered are classified in textbook categories with data neatly arranged in the best logical form. The trend today, therefore, in the teaching of Arithmetic lies in the direction of what is called "socialized" Arithmetic; that is to say, the Arithmetic exemplified in the day-by-day activities of social life and relationships. These situations are much more meaningful to the student of average ability than the abstractions from the older textbooks.

The Topical Procedure.

To students of more than average ability who are specializing in commercial subjects and have a vocational outlook in their study of Arithmetic, a treatment of the following topics may be offered:

(1) Trade Discount.
(2) Profit and Loss.
(3) Commission.
(4) Insurance — fire, auto, hail, plate glass, theft, weather, etc.
(5) Taxes—land, income, sales.
(6) Duties—excise and customs.
(7) Simple Interest.
(8) Bank Discount — Direct problems, and finding the interest rate equivalent to the discount rate.
(9) Instalment buying.
(10) Partial Payments.

References.—Nos. 1, 2, 6 and 13; Nos. 22 and 24.

It cannot be too strongly urged that teachers spend a considerable share of the class time in presenting the informational side of business Arithmetic. If the course is purely one of computation, a great deal of its value and interest to the student is lost. The informational content will repeat in a more extended form a considerable amount of material that will already have been taken by many of the students in their Grade IX course in Junior Business and Elementary Bookkeeping, and some of it in their Grade IX course in Social Studies. Obviously, any course in business Arithmetic has many points of contact with Social Studies which the alert teacher will not overlook.

Life-Interest Units.

It is here suggested that for students who are not specially interested in a vocational outcome for their study of business Arithmetic, the teacher group problem data and materials in units of work similar to the following which may be taken as examples:

1. The Family Budget for Food, Clothing, Shelter and Recreation: cost of a well-balanced diet; the "stretching" of purchasing power by planning; waste in the home expenditures; the cost of clothing —ready-made vs. homemade, bargain sales; the cost of education, of recreational and cultural activities.
2. Buying: cash vs. credit—the reason for the vast extension of credit buying during the last ten years; "charge accounts," instalment buying and computation of rate of interest; quantity buying.
3. Owning a home: cost of up-keep—taxes, insurance, allowance for depreciation; owning vs. renting.
4. Owning an automobile: original cost; depreciation; cost of operation and up-keep. How much does it cost the average person to own and operate a care for a year?

5. Investment of savings: interest—simple and compound; securities; bonds; debentures; stocks; mortgages; annuities; savings certificates; insurance as an investment.
6. Life Insurance: life expectancy and mortality tables; different plans of insurance; the cost of insurance; the cash surrender value of insurance policies; loans on insurance policies.
7. Taxation in Alberta:
   (a) Indirect taxes paid to the Dominion Treasury through duties, customs and excise, Dominion sales tax.
   (b) The Dominion income tax.
   (c) Provincial taxes in Alberta—the income tax, the amusement tax, the gasoline Tax; Alberta's problem of finding through direct taxation adequate support for necessary social services, including education, public health, etc. (In connection with these topics teachers will find some excellent material in "The Case for Alberta.")
8. The Dominion and Provincial Budgets—analysis, showing percentage distribution, with circle graphs to illustrate. (See Reference No. 7, page 99.) Similar studies of the "tax dollar" in cities, municipalities, and school divisions or districts.
9. The production of wealth in Alberta and in the Dominion of Canada; the monetary value of this wealth; capital investment and the distribution in different types of productive industry; the national income of Canada and the income of Alberta—the distribution of these incomes and the amount available to consumers as purchasing power.
10. Problems of the wheat grower, the dairy farmer, the coal producer, etc., in Alberta; the cost of production; co-operative marketing; the problem of farm debt in Alberta.

References.—No. 22 and No. 24.

Data for a great variety of problems in connection with these last four units may be found in the "Canada Year Book," and in "The Case for Alberta."

Division III. Algebra and Technical Arithmetic.

1. With General Shop and Shop Subjects.

Here the ideal set-up would be that the shop instructor should also be the instructor in Mathematics. Since this is rarely possible, the instructor in Mathematics should keep in mind that shop-work should be the background for the work in Mathematics, and he should keep constantly in touch with the shop instructor and to a large extent draw his examples from the work being done in the shop.

The work in Divisions I and II of Section A should be emphasized and elaborated. Pupils should be trained to estimate their answers as a check on their actual solution. All answers should be examined from the point of view of reasonableness.

It is suggested that a selection be made from the following topics:

(1) Use of formulae for areas of surfaces other than those given in Section A (3); i. e. ellipse, regular polygons, segments of circles, etc. (In reference to the circle use π D and $\frac{\pi D^2}{4}$ rather than $2\pi R$ and πR^2.)

(2) Simple uses of specific gravity.
(3) Board Measure.
(4) Use of Algebra in formula work, changing subject of formula, simple equations, equations in two variables.
See Reference No. 3, pages 280-296.
(5) Use of Geometry in drawing plans, perpendiculars, parallels, etc.
(6) Use of tables of weights of materials, specific gravity, conversion tables, equivalents, etc.

References.—No. 3 and No. 10.

2. With Home Economics.

Some of the units of work suggested for Division II of this section may be found suitable. These may be supplemented with some or all of the following units:

(1) Simple Accounting.
(2) Instalment Buying.
(3) Power and fuel problems.
(4) Problems in cooking.
(5) Dressmaking problems.

Reference.—No. 15.

General Mathematics 2

In the second unit in General Mathematics, the same arrangement is kept as in the first unit; viz., the work is divided into two Sections of three Divisions each, as shown in the scheme below. The teacher, having decided at the beginning of the school year on the particular bias his class is to follow, will stress certain of the Divisions of Section A and supplement them with topics chosen from the supplementary outline of Section B for his particular type of class.

Scheme of Work

Section A:
Division I—Mensuration and Geometry.
Division II—Trigonometry.
Division III—Graphs.
Division IV—Statistics.

Section B:
Division I—Algebra, Geometry and Trigonometry.
Division II—Commercial Mathematics.
Division III—Technical Mathematics.

The intention is not that the work in Section A be completed before the class proceeds to supplementary topics, but rather that the teacher, having decided on the work his class will take, shall arrange the order and amount of work in the best manner possible.

For example, a teacher having decided that his class must have a "commercial" bias would not stress Division I of Section A as heavily as he would if his class were "technical." He might select work from some or even all of the Divisions of Section A, but he should relate this work closely to Division 2 of Section B.

Division I. Mensuration and Geometry.

1. Review of first-year formulae.
2. Areas of the surfaces of pyramid, cone, frustra of both, sphere, annular ring.
3. Volumes of pyramid, cone, frustra of both, sphere.

   Note: Formulae involving the radius should also be given in terms of the diameter; e.g., $4/3\ \pi\ r^3 = 4/3\ \pi\ (d/2)^3$ and $= \frac{\pi\ d^3}{6}$.
4. Volumes of compound solids.

   Note: (1) Make the work as objective as possible by reference to numerous simple practical problems.

   (2) Continue the use of logarithms as a useful tool in minimizing mechanical work.

   References.—No. 3, pages 205-235.
   No. 1, pages 104-130.
   No. 5, Chapters 20-22, 24 and 25.
5. Ratio and proportion; similar figures—both plane and solid. Stress on length, area and volume.
   Reference.—No. 5, Chapters 16-18.
6. Ratio and proportion (and variation)—other applications.

   Reference.—No. 8, Chapter V.

Division II. Trigonometry.

1. Angles, positive and negative; systems of measurement.

   References.—No. 4, Chapter 2.
   No. 16, Chapter I.
2. Trigonometric Functions: sine, cosine, tangent, cotangent, secant, co-secant, in terms of ordinate, abscissa and distance for any angle between 0° and 360°.

   References.—No. 4, Chapter 3.
   No. 16, Chapters II and V.
   No. 9, Chapter VII.
3. Trigonometric functions of common angles 0°, 30°, 45°, 60°, and 90°. These are to be read from figures, not memorized. Use of these values to find the value of functions of 120°, 135°, 150°, 180°, 210°, 225°, 240°, 270°, 300°, 315°, 330°, 360°.
4. Use of tables to find trigonometric functions of any angle between 0° and 360°.
   References.—No. 4, Chapter 4.
   No. 9, Chapter VII.

   Mathematical and Physical Tables: Knott's Tables or Clark's Tables.
5. Solution of right triangle by use of natural functions and logarithms.

References.—No. 4, Chapter 5.
No. 16, Chapter IV.

Note: Teachers wishing to use the "bar" system of logarithms will find no difficulty with Clark's tables; e. g., log. tan 5° $=8.9420$ or $8.9420-10=\bar{2}.9420$.

6. Problems dealing with heights and distances, and angles of elevation and depression, and involving the solution of the right triangle.

References.—No. 4, Chapter 5.
No. 16, Chapter IV, Chapter XIII, pages 158-161.

Division III. Graphs.

Much of this work may be done in connection with the work of Division IV. The pupils have had some experience with statistical graphs in Grade IX. See Reference No. 7.

(a) Bar Graphs.
(b) Line Graphs.
(c) Distribution Graphs.
(d) Graphs of first degree functions—slope.
(e) Graphs of second and higher degree functions, particularly as relating to formulas; e.g. $A=\pi r^2$; $s=\frac{1}{2}at^2$.
Particular cases of Amount: $P(1-a)^n$; e.g. $150(1.05)^n$.

References.—No. 3, Chapter IX, page 114.
No. 10, Chapter IX.
No. 9, Chapter VIII.
No. 23, Chapter VIII.

Division IV. Statistics.

1. In addition to the work on graphs mentioned above, the meaning and use of the following terms:
   (1) mean (2) median (3) mode
2. Graphs of frequency distribution.
3. The standard deviation.

References.—No. 17; No. 9, Chapter XVII.

Section B

Division I. Algebra, Geometry and Trigonometry.

(For classes not definitely Commercial or Technical.)

1. Review and extension of work on type products and factoring.

2. Algebraic fractions and problems involving same—not too complex.

3. (a) Special products and their factors.
   (i) Common factor obtained by grouping terms.
   (ii) Sum of Cubes.
   (iii) Difference of Cubes.
   (iv) Factor theorem and its bearing on solving simple equations.

Reference.—No. 8, Chapter III.

(b) Operations with simple algebraic fractions.
Reference.—No. 9, Chapter IV.

(c) Simple operations with quadratic surds, rationalizing denominators.
Reference.—No. 8, pages 173-185.

4. (a) Plotting graphs of quadratic functions; reading roots of quadratic equations from graphs of quadratic functions.

(b) Solving quadratic equations by factoring the function and by formula.
Reference.—No. 8, Chapter VII.

5. Additional geometry; the circle, loci, lines and planes.
Reference.—No. 5, Chapters 10 and 15; Chapters 18, 19 and 23.

6. Laws of Sines and Cosines.

7. Using the Laws of Sines and Cosines in solution of oblique triangle.
References.—No. 4, Chapters 4 and 9.
No. 16, Chapters XII and XIII.

Division II. Commercial Mathematics.

In addition to work in Section A, the following topics:

1. Exchange—direct.
2. Partnership.
3. Stocks and Bonds—note treatment of "brokerage" in Reference No. 2.
4. Compound Interest—with tables.
5. Present Worth—with tables.
6. Comparison of Simple Interest, Compound Interest and Present Worth by graph.
7. Simple Annuities. (Formal theory of the Geometric Progression not required.)
   (a) Explain the series.
   (b) Show how to locate any term.
   (c) Give formula for the sum of any number of terms, and for sum to infinity.
   Involved problems are to be avoided.
8. Mortgages, Bonds, Debentures.

A very good treatment of the mathematics of investment and financing may be found in Chapter 5 of Reference No. 6—**A Commercial Arithmetic for Secondary Schools,** by A. T. Batstone.

A treatment of annuities and of amortization may be found in Crawford's **Senior High School Algebra,** which, however, is now out of print. This book has some interest and present-worth tables and a table of mortality.

An excellent though advanced reference for teachers is Part III of **First Year College Mathematics,** by Hill and Linker (Henry Holt & Co.). Part III is entitled "Mathematics of Finance" and covers interest and discount, annuities, amortization, sinking fund, depreciation, bonds, life annuities and life insurance, and has a complete set of tables.

Re Tables

A very good set of tables for compound interest, present-worth and annuities may be found in Reference No. 6.

See also the note on page 7 (second paragraph), above, regarding reprinted tables available from the Examinations Branch of the Department.

Division III. Technical Classes.

1. Volumes, as Reference No. 3, Chapter XII, page 205.
2. Laws of Sines and Cosines and their use in the solution of the oblique triangle.

   References.—No. 4, Chapters 4 and 9.
   No. 16, Chapters XII and XIII.
   No. 9, Chapter XIV.

3. Specific gravity and weight (including work with metric units).
4. Use of tables of various types.
   (a) Specific gravity.
   (b) Weights.
   (c) Construction tables—as cement mixtures, shingles, etc.
   (d) Table connecting side and area of regular figures as in Reference No. 3, page 102.
5. Graphs—as above—using technical data—efficiency curves, etc. Excellent sets of tables concerning electrical data, construction data, materials, etc., may be had from electrical firms, such as Westinghouse, General Electric, Lumber Companies, etc.

   References.—No. 10, No. 3 and No. 14, Engineers' Handbooks.

6. Graphs of trigonometric functions with practical applications.

   References.—No. 18, No. 19 and No. 20.

General Mathematics 3

This third unit in General Mathematics is a Technical Elective (Group C), not a General Elective (Group D). The content of the course has a strictly Technical bias and should be correlated as much as possible with problems that occur in the shop courses taken by the students. The approach should be largely objective so that when the students leave school they will have some mathematical equipment that can actually be put to use.

The topics here listed are some of the many that can be treated in Third Year. This statement does not mean that a student is expected to "cover" all of them; nor does it mean that he cannot study others that are practical and useful. This list is then a basis of operation. **Free use should be made of mathematical tables, or of slide-rules,** to minimize the labour of calculation.

1. A brief review should be given on—
   (a) Solution of right triangle.
   (b) The sine, cosine, tangent functions of 0°, 30°, 45°, 60°, 90°, and their supplements.
   (c) Using the Sine Law and the Cosine Law in solution of oblique triangles.

2. Use of Tangent Law, and the tangent of half an angle in the solution of oblique triangles.
3. Mallweide's Equation for checking the accuracy of numerical solutions of triangles.
4. Calculation of heights and distances that cannot be measured directly.
5. Vectors:
   (a) Application to composition and resolution of forces.
   (b) Triangle, parallelogram and polygon of forces.
   (c) Electrical calculations involving alternating current.
   (d) Navigation problems in air or on water.
   (e) Direction of one point from another.
   (f) Forces acting on wings of an aeroplane.
   (g) Forces acting on sail of sailboat.
   (h) Coefficient of friction.
6. Application of trigonometric functions to—
   (a) Calculation of tapers.
   (b) Cutting of screw threads.
   (c) Spirals.
   (d) Inclined plane.
   (e) Angle of repose.
7. Evaluation of formulae.
8. Calculation of rim speed of fly-wheels, grinders, etc.
9. Gear ratio, pulley speeds, cone pulleys.
10. Moments of forces.
11. Variation.
12. Stresses and Strains.
13. Lengths of belts, open and crossed.
14. Application of graphs, wherever they can be used to any advantage, as for example, the graph of the sine in alternating current electricity.
15. Area of triangle, with the following data given:
   (a) Base and altitude.
   (b) Three sides.
   (c) Two sides and contained angle.
   (d) Two angles and one side.

References.—No. 3, No. 4, No. 10, No. 25 and No. 26.

ALGEBRA

Algebra 1

It is intended that this course be approached from the point of view of variable and function. The central problem here may be stated as follows: Given values of the variable, compute the corresponding values of the function. From the beginning the student should be directed to draw charts showing the curves (including straight lines) obtained by "plotting the function against the variable." (See page 62.) Persistent practice should be given in using such a chart to estimate values of the function corresponding to given values of the variable and *vice versa*.

The next step is to use such a chart to estimate the roots of an equation in one variable. Thus the abscissas of the points at which the graph of the function x^2-5x+6 cuts the x-axis are the roots of the equation $x^2-5x+6=0$; the abscissas of the points at which this curve cuts the horizontal line 2 units above the origin are the roots of the equation $x^2-5x+6=2$; i.e. $x^2-5x+4=0$; and so on. This work, of course, does not mean that the usual algebraic devices for obtaining such roots are to be neglected. The important point is that **our theory of equations is to grow out of our theory of functions.**

If we use the symbol to represent a function, x^2-5x+6 for example, then the same curve which is the graph of the **function** x^2-5x+6 may be regarded as the graph of the **equation** $y=x^2-5x+6$ in two variables x and y. Every point on the curve gives a **solution** of the equation. It follows that the common solutions of two equations in two variables can be estimated from the common points of their graphs. The usual algebraic devices for finding these common solutions are to be studied carefully. The chart method of finding common solutions is to be regarded as the basis of the work in Chapters II and IX.

The work on exponents, including the logarithm notation, should be based, of course, on the functions 10^x and log. 10^x, simple ideas of interpolation being obtained from the graphs of these two functions.

It is not intended that the teacher shall "teach the textbook to the pupils." The course is to be centred on the idea of the relation between variable and function. The concepts represented by the different chapters are to be taught thoroughly but the textbook is to be regarded only as consellor, guide and source of material from which illustrative examples may be selected.

Special Note for the Teacher

It is expected that the teacher will exercise intelligent discretion in assigning exercises to his classes. For example, Chapter III, dealing with special products and factoring, contains an abundance of exercises. It is not expected that the average student will work all these exercises. If the student has mastered the type cases, viz. distributive factoring, factoring easy trinomials, the difference of two squares, the difference and sum of two cubes and the factor theorem in their simplest forms, the purpose of this chapter has been fulfilled in the average case. Abundance of harder exercises are placed in the text to appeal to the student of more than average ability. Chapters IV and V are to be treated from the same point of view. In fact these remarks apply to the entire course. If the teacher undertakes to teach this course in the old-time way of simply adding up so many sections of the book to be done in a given time he will find his task impossible. If he uses the book as a guide in teaching fundamental concepts and manipulations, the amount of actual work to be done being adjusted to the ability of the pupil and available time, no insurmountable difficulty should be encountered.

The prescribed textbook indicates the scope of the course.

Textbook:—Betz, Robinson and Shortliffe: **Algebra for Today** (Ginn & Co.).

Algebra 2.

This course continues the treatment of functions of one variable begun in Algebra 1. The graphing of functions provides an introduction to the notion of rate of change in a variable or a function, and thereby serves as an elementary introduction to the principles of the infinitestimal calculus.

Textbook:—Durrell & Wright: A New Canadian Algebra (Clarke Irwin Company), Chapters I-IX (inclusive). Revision exercises are to be used for checking, practice, and review.

GEOMETRY

Geometry 1.

The prescribed textbook, **Geometry for Today,** constitutes the course.

The text will at first appear to contain more material than students can master in a year; but if the following points are observed by the teacher it should be possible for students to secure a thorough training in the mathematical concepts, arguments and methods of the entire text.

The quizzes at the beginning of Chapters I, III and VI may be used as pre-tests to determine the amount of review, new teaching, discussion and problem work which will be necessary.

Reviews should not be prolonged to the point where interest is lost.

Chapters I to VI (inclusive) should not consume more than six to eight weeks. They contain much that has been learned in Grade IX. Teachers should make a judicious selection of the problems to be attempted, and should stimulate interest by emphasis on the new topics, such as map-problems, inequalities, conic section, mid-point theorems and three-dimensional figures. The number of measured constructions should be kept quite small.

The trigonometric tables at the end of the book for use in Chapter IX and in subsequent exercises give angles to the nearest half degree.

Functions for angles to the nearest tenth of a degree may be read in Knott's **Mathematical Tables** without interpolation. If the textbook tables are used, these should be read without interpolation to obtain results to the nearest half degree only.

Chapter X re-states many propositions that have already been assumed. Students are expected to secure training in defending these by well arranged argument, and to recognize the meaning and development of logical thinking in which certain words and certain propositions are assumed as given. They are to develop their own proofs, approaching the traditional style, which has been found both brief and convincing. Students are not to memorize proofs.

The teacher is encouraged to exercise freedom in the distribution of time between the topics and in the selection of exercises.

Revision Exercises will be found at the end of the textbook.

A Guide-Book for the use of teachers has been prepared to accompany this textbook.

Textbook:—*Geometry for Today:* Cook (Macmillan Co.).

TRIGONOMETRY AND ANALYTICAL GEOMETRY

This course supplements the work of Algebra 2 with respect to the trigonometric functions and the graphical representation of functions. It deals also with some of the geometric properties of conics, and introduces some exercises in Mechanics. It is offered as a second course at the third-year level for students who have a special interest in Mathematics.

During the year 1940-41 the course will be based on material selected from the following textbooks now in use:

Conant: *Plane Trigonometry* (American Book Co.).

McDougall and Sheppard: *Analytical Geometry for High Schools* (Copp, Clark Co.).

Merchant, Chant and Cline: *Mechanics, an Elementary Textbook* (Copp Clark Company). A few copies will be sufficient for each class.

N.B.—Despite the use of three textbooks, the parts of the course are not to be treated separately. In so far as possible they should be integrated, with frequent reference to relevant parts of the course in Algebra 2.

Trigonometry.

The topics are included in Chapters I-IX and Chapter XII. The topics are listed below but not necessarily in the order of treatment.

(1) Chapter I.—Angle measurement. Radian measure may be omitted except for brief reference later in the course.

(2) Chapters II, III, V and VI.—The trigonometric functions omit versine and co-versine. The trigonometric ratios of acute angles should be defined early in the course in terms of co-ordinates, and attention to them as "functions" should be emphasized so as to correlate with the concepts and methods of Algebra.

(3) Chapter IV.—Indirect measurement (the right triangle).

(4) Chapter V.—The sine and cosine graphs with simple associated graphs as 2 sin x, sin 2x, sin $\frac{x}{2}$, etc. The graphs of the other functions are of secondary importance, and should be treated briefly.

(5) Chapter VII.—The solution of the very simplest equations only.

(6) Chapters VIII and IX.—The addition and subtraction identities for sines and cosines. Proofs for acute angles only. The use of these identities to change sums into products and *vice versa* is to be practised with simple examples; likewise with double and half-angle formulae in the first two sections of Chapter IX. The addition and subtraction identities in Chapter VIII for tangents may be illustrated with the slopes of lines, but should be treated briefly.

(7) Chapter XII.—Indirect measurement (any triangle). The tangent laws in this chapter may be omitted, with the stress on the laws of sines and cosines. The table of squares in Knott's *Mathematical Tables* will facilitate the use of the law of cosines.

The area formulae should be restricted to cases *1* and *3* in section 103.

In teaching the above materials, the instructor should omit artificially complicated exercises of the textbook. The student should not be required to memorize lists of formulae of secondary interest. The principal formulae should be learned through simple exercises and applications.

Formulae involving the use of cotangent, secant and cosecant should be omitted.

Mechanics.

The following exercises in *Mechanics* are to be considered as part of the course, although the theory underlying the principles will **not** have to be reproduced by students on examinations:

Page 151—Nos. 3, 4, 5, 6; page 153—Nos. 1, 2, 5, 6, 7, 10; page 156—Nos. 1, 2, 4, 5, 7, 8, 9; page 179—Nos. 1, 3, 5, 8; page 194—Nos. 2, 3, 5, 10, 11, 12, 16.

Wherever possible, the teacher should introduce other applications of Trigonometry.

Analytical Geometry.

The aim is to give a brief treatment of the straight line, the circle, the parabola, ellipse and hyperbola, particularly brief for the ellipse and hyperbola.

The following topics should be omitted: oblique co-ordinates, the normal form of the straight line (section 35), perpendicular distance from a point to a line (sections 45-53), rotation of axes, poles and polars, the tangents from an external point (except, perhaps, section 102). In addition sections 88, 89, 90, 97, 103, 107-110 on the parabola should be omitted.

Proofs should not be memorized; the methods should be practised with numerical exercises.

Only one form of the linear function, the slope-intercept form, should be learned. The exercises of Chapter II can be worked in terms of this single form.

The treatment of the ellipse and hyperbola should be confined to the definitions of the curves, the derivation of the standard equations. and the sketching of the curves from the standard equations,—all illustrated with simple numerical examples. If time permits, tangency can be briefly considered.

Foreign Languages

In high-school programmes of the older type it has been usual to find a list of theoretical aims and objectives for the teaching of foreign languages, with little or no regard for the personal qualifications of different groups of students who may seek instruction in these subjects. It was assumed that a majority of the students will take instruction in foreign languages, either ancient or modern, and that for all of these students the same objectives will be realized.

In programmes of a more recent type, however, the subjects of instruction have been chosen to meet the needs of a large group of students who differ greatly in their abilities, attitudes and personal qualities. It is

to be expected, therefore, that in any class of high-school students who are studying French or German, there will be found students who have a special aptitude for the study of languages and at the same time students who, although not possessing this special aptitude, are taking instruction in the languages in order to meet the entrance requirements of certain institutions for higher vocational or academic training.

The result is that there may be a conflict of aim in the teaching of French, for example, to high-school students. Those who desire to achieve a conversational command of the language will be interested in certain features of the instruction that will make no appeal to candidates for matriculation who are interested in acquiring merely a reading knowledge of the language. Obviously, this difficulty cannot be resolved until agreement is more general with respect to the validity of matriculation requirements in foreign languages.

This matter has an important bearing not only on the actual procedures of the classroom but also on the type of test or examination which is to be given to students at the conclusion of the third unit of the course in a foreign language. If conversational facility is to be the most important aim in the teaching of French, it must follow that the student's final rating should be based on his oral and aural proficiency. If, on the other hand, a reading knowledge of the language is the important objective, then the final examination should be a test of reading comprehension based not only on assigned reading but also on sight reading.

Pending the final solution of this problem, the Department of Education has taken some steps towards modernizing the type of final examination in the third units of the three foreign languages, Latin, French and German. Candidates should therefore expect that the examination will include a considerable number of questions of the objective type; and, moreover, that their ability to read a passage of the foreign language which they have not seen before and gather the meaning of the passage accurately will have a very important effect on their final score. Translation from the foreign language into English will still be required, but to a considerably less extent. Likewise, the amount of translation to be required on the examination from English into the foreign language will be considerably reduced. A reasonable mastery of verb-forms, grammatical constructions and fundamental vocabulary will, of course, be necessary either for the purpose of conversational use or of comprehension.

LATIN

Latin 1.

The course follows the prescribed textbook.

TEXTBOOK:—Thompson, Tracy & Dugit: *Essential Latin*, pages 1-250 (Clarke, Irwin & Company).

Latin 2.

TEXTBOOKS:—

Grammar: Thompson, Tracy & Dugit: *Essential Latin* (Clarke, Irwin & Company).

Reading: Bonney & Niddrie: *Latin Prose and Poetry* (Ginn & Company).

Teachers' Reference: Baker and Inglis: *Latin Prose Composition* (Macmillan Co.).

Required Reading

(a) The following selections from *Latin Prose and Poetry* are required for the year *1940-41*, and every alternate year thereafter:

Part I:

Caesar—All selections except No. VII.
Eutropius—All selections except No. V.
Phaedrus—The following selections: No. II, III, IV, V, IX and X.
Ovid—Selection No. VI, "*The Death of Icarus*," and No. VIII, "*The Race.*"

Part II:

Martial—All selections.

(b) The following selections from *Latin Prose and Poetry* are required for the year *1941-42*, and every alternate year thereafter:

Part I:

Gellius— Selections I to IX (inclusive).
Nepos—Selections I to XI (inclusive).
Vergil—Selections IV, V, VI and VIII.

Latin 3.

TEXTBOOKS: *Grammar:* Thompson, Tracy & Dugit: *Essential Latin* (Clarke, Irwin & Company).

Teachers' Reference: Bennett: *Latin Grammar* (Allyn & Bacon).

Reading:—Bonney & Niddrie: *Latin Prose and Poetry* (Ginn & Company).

Prose Composition: Bonney and Niddrie: *Latin Prose Composition* (Ginn & Co.).

Suitable material may be chosen from this book to supplement the textbook in Grammar.

Required Reading

(a) The following selections from *Latin Prose and Poetry* are required for the year *1940-41*, and every alternate year thereafter:

Part I:

Vergil: Selection IX.
Ovid: Selections I, II and IX.

Part II:

Livy: Selections I to VIII (inclusive).
Pliny: Selections I to IX (inclusive), and selections XI and XII.
Catullus: Selections I to VI (inclusive).

(b) The following selections from *Latin Prose and Poetry* are required for the year *1941-42*, and every alternate year thereafter:

Part II:

Cicero: Selection II, page 135.
Cicero: Letters I-VIII (inclusive).
Livy: Selections IX, X, XI, XII, XIV and XV.
Vergil: Georgics, Nos. I, IV and V.
Horace: Odes I-VI (inclusive), and No. IX.
Ovid: Selection IX.

FRENCH

French 1.

Textbook:—Roux: *Premier Cours de Français* (Macmillan Company). Lessons 1-25, including review exercises.

Teachers' Reference:—*A Teacher's Manual and Key to accompany Premier Cours de Français.*

Grammar:—A study of the principal parts, and the future, imperfect, past definite, present indicative, imperative, and past indefinite tenses of the following verbs for recognition purposes: *donner, finir, répondre, avoir, être, commencer, écrire, savior, aller, faire, prendre, dire, voir, pouvoir, traduire, mettre.* It is suggested that suitable exercises of the text be reviewed in the above tenses.

Reading:—Saxelby: *À L'Enseigne du Coq* (Ginn & Company).

Thirty pages of the reading text should be read intensively, and teachers should encourage students to read as much more as possible extensively.

N.B.—Reading from the prescribed textbook by Saxelby is required for credit in this course.

French 2.

Textbook:—Roux: *Premier Cours de Français* (Macmillan Company). Lessons 26 to the end.

Teachers' Reference:—*A Teacher's Manual to accompany Premier Cours de Français.*

Verbs: The sixteen verbs covered in the French 1 course shall be studied for mastery, and the following shall be studied for recognition: *boire, vouloir, venir, lire, devoir, connaître, ouvrir, croire, partir, s'asseoir, envoyer, falloir, mener.*

All above verbs shall be learned in the five principal tenses—the future, past indefinite, imperative, imperfect indicative, present subjunctive, and conditional forms.

Reading:—Hedgcock and Hugues: *Légendes et Contes de France* (Clarke, Irwin Co.).

Easy passages for sight translation.

French 3.

Textbooks:—Grammar and Composition:—E. B. Travis and J. E. Travis: *Cours Moyen de Français,* Part I. This book contains, within the scope of the vocabulary furnished, exercises in fundamental language constructions and in continuous prose and free composition. Gramophone records are available for some of the material in the textbook. Teachers should direct their inquiries to Clarke, Irwin and Co., 480 University Avenue, Toronto.

Teachers' Reference:—Ritchie and Moore: *Elementary French Composition* (Thos. Nelson & Sons).

Reading:—*Sans Famille:* Hector Malot (Edited by A. L. Cru: J. C. Winston Co.).

N.B.—It is likely that for the year 1941-42 and every alternate year thereafter a different book will be prescribed.

GERMAN

German 1.

TEXTBOOK:—Chiles and Wiehr: *First Book in German* (Ginn & Company). Lessons 1-15, including review exercises.

Reading:—Hagboldt: *Fünf berühmte Marchen* (Copp Clark Co.).

Hagboldt: *Eulenspiegel und Münchhausen* (Copp Clark Co.).

Occasional practice in German script should be given.

German 2.

TEXTBOOK:—Chiles and Wiehr: *First Book in German* (Ginn & Co.). Lessons 16 to the end.

Reading:—Bauer: *Das Geheimniss des Jannshofs* (Heffer & Sons).

Kästner: *Emil und die Detective* (Bell & Sons).

Easy passages for sight translation.

German 3.

TEXTBOOKS:—Grammar and Composition:—Chiles and Wiehr: *First Book in German* (Ginn & Co.). The whole book will be used for review and for reference.

Reading: Hinz: *Das Geheimnisvolle Dorf* (Copp, Clark Co.).
Storm: *Immensee* (Macmillan Co.).
Kästner: *Die Verschwundene Miniatur* (Copp, Clark Co.).

"1A" Commercial Subjects

N.B.—Outlines for the courses in Bookkeeping 1 and 2, Typewriting 1 and 2, Stenography 1 and 2, and Office Practice 1 may be had in mimeographed form from the Department of Education on request. (Bulletin V.)

Reference will also be found there to a one-year course for special students.

BOOKKEEPING 1A

General Statement:

The objectives in teaching high school Bookkeeping may be arranged in three groups; namely, social, personal, and vocational. Experience has shown that, during the first year, social and personal objectives should be given prime consideration. Major emphasis should be placed on the development of an understanding and an interpretation of the general field of business activity. In the work of the second year, the vocational objectives should receive more prominence. Among the social objectives may be noted the following: (a) The students should be helped to become more intelligent citizens by increasing their knowledge and understanding of the nomenclature and processes of the business world in which they live. Part of this knowledge and understanding will come from ability to read and interpret the records of business, and part from meaningful experiences touching business activities and relationships in the local community. (b) The students should be enabled to participate more fully as citizens, regardlessly of their vocations, through a serviceable knowledge of documents, customs and records, of business practices and

procedures, and of such elementary accounting principles as can be used in the course of the year's study. Among the personal objectives may be listed the following: (a) an increase in the pupils' self-reliance through a development of their powers of analysis and interpretation; (b) training incidental to the filling out of the commonest business papers, and to routine record-making; (c) habits of neatness and mechanical accuracy; (d) improvement in the ability to devise, to adapt and to use a simple set of records; e.g., a special cash book, suitable for small businesses.

The attainment of the foregoing objectives will require that the classroom procedures stress discussions, group reports, exhibits, special investigations and studies, and class projects. There should be a minimum of direct instruction in theory. The theory should be taught in meaningful situations; and hence the prescribed Study Plans should form the basis of the course. The text-book should be used mainly for reference purposes.

Requirements:

1. Satisfactory completion of at least ten Study Plans.
2. Satisfactory participation in correlative activities, projects and studies.
3. Satisfactory improvement in respect of each of the objectives outlined above.
4. Broad acquaintance with the subject-matter of the text-book, and an intensive study of the first one hundred and thirty (130) pages.

Textbook: Baker, Prickett and Carlson; *20th Century Bookkeeping and Accounting*—Elementary Course, Canadian Edition (W. J. Gage & Co.); *Study Plans*, Part 1, to accompany the textbook.

TYPEWRITING 1A

This is a non-vocational course intended to give the student a mastery of the typewriter sufficient for practical purposes.

This course may be offered only in those schools which are equipped with well-serviced machines in a good state of repair. Every student should have a machine to himself throughout the period of instruction-time. Typewriter desks, each to accommodate two machines, should be from 26 to 30 in. in height, measured from the top of the table to the floor. Key-board wall charts and diagrams of the parts of the typewriter save much time and make the presentation more vivid. A few enlarged photographs, available sometimes through the equipment companies, can be used to advantage. A supply cabinet that can be locked will be found useful in keeping track of paper, envelopes, ribbons, duplicating paper, stencils, oil, tools and such. Other equipment for the typewriting room includes a stopwatch or an interval timer, a large wall calendar, postal scales, paper cutter, stapling machine, suitable filing cabinet, an unabridged dictionary, and a secretarial handbook (e.g., *Standard Handbook for Secretaries* by Hutchinson—McGraw Hill Book Co., New York).

It is of the first importance that the teacher devise satisfactory records of the students' attainment and progress and adequate methods of analysing special difficulties and disabilities of individual students. Progress charts,

graphs and various motivational devices will be found useful in stimulating interest and sustained effort. Students should keep records of their own work; they should be assisted to classify and record their own errors and successes; then, with the teacher's help, to study them for causes and tendencies. Anything that keeps the student in competition with HIMSELF will be found worthwhile; his own record in accuracy, speed and daily output of acceptable work.

All inexperienced teachers should be guided by the detailed directions in *Principles and Techniques for Directing the Learning of Typewriting* by Odell and Stuart (Copp Clark Co.).

During the first six weeks, the student will learn most of the habits which will determine his ability or inability as a typist. For this reason it is very important that the teacher supervise carefully all the work done by beginning students. Class instruction is needed as in any other subject, and this cannot be given if the teacher is busy with other work.

Outline of the Course

First Unit: The objectives in the first unit will be the development of a mastery of the alphabetical key-board by touch, with rhythm, and fingering technique, and the correct manipulating of the operative parts of the machine. The following should be considered:

(a) Correct operating technique: posture, stroke, rhythm, handling paper.
(b) Correct manipulation of the machine parts: key-board, space bar, carriage, carriage release, carriage return lever, thumb piece, cylinder, cylinder knobs, line-space gauge, front scale, marginal stops, paper rest, paper guide, paper clamps, ribbon spools, ribbon spool handle, stencil lever.
(c) Horizontal centering: new machine parts: backspacer.
(d) Capitals, sentences, simple punctuation marks, one-minute timed tests, new machine parts: shift keys and shift lock.
(e) Paragraphs, new machine parts: marginal release, bell tabulator rack, stops and key.
(f) Re-inserting paper, new machine parts: variable line-spacer: type guide; cylinder scale, backspacer.
(g) Vocabulary: one hundred of the five hundred most used words. Material: Stuart, Blocks 1, 2 and 3.

Second Unit: The student should master the complete key-board by touch, and develop skill in manipulating the operative parts of the machine. The content will include the following:

(a) Figures.
(b) Signs.
(c) Vertical centering.
(d) Rules for syllabication.
(e) Rules for writing of numbers in figures and in words.
(f) Rules for capitalization.
(g) Envelope-addressing.
(h) Vocabulary: one thousand commonest words.
(i) Time tests to ten minutes. Material: Stuart, Blocks, 4 to 12.

THIRD UNIT: The student should be given further drill on the skills already acquired. Moreover, he should develop the special knowledge and skill required for letter-writing. The content includes the following:

(a) Mechanical details of a letter: main divisions, placement rules for single-spaced letters; styles in letter-writing; proof-reading; folding of envelopes.

(b) Improved facility in continuity writing: usage, sentence-sense, unity, coherence; characters and figures. Material: Stuart: Blocks 13 to 20.

FOURTH UNIT: The student should learn proper habits in the care of the typewriter and understand some simple operations essential to his personal needs. The content includes the following:

(a) Tabulation: paragraph and address indentation; simple two to four-column tabulations of words or figures.

(b) Care of the typewriter: covering, dusting, oiling, cleaning the type and cylinder.

(c) Changing the ribbon.

(d) Carbon copies: use, method of inserting sheets.

(e) Typing on ruled lines: need for typing on ruled lines in partly printed forms and legal documents: use of variable line space push button; use of line space disengaging lever.

(f) Stencil-cutting: Stuart, page 164.

REQUIREMENTS:

1. Satisfactory completion of the prescribed textbook material.
2. Satisfactory completion of a reasonable number of correlative exercises in connection with classroom work in other subjects.
3. Attainment of a copying speed of fifteen to twenty-five net words a minute (as measured under International Contest Rules) on standard test material (available through the equipment companies) of at least ten minutes in length, with not more than one or two per cent. of error.
4. The student should meet the minimum standard of attainment on at least three tests administered at intervals of one week.

TEXTBOOK: Stuart: *Complete Typewriting Course*, Part 1 (Copp Clark Co.).

N.B.—The number of periods per week for Typewriting 1A is three, but these periods must be used for instruction by the teacher. Periods used merely for practice by the student without the teacher's direction or supervision cannot be counted as instruction periods. Throughout each instruction period there must be one machine for each student. If there are more students in the class than there are machines, the number of instruction periods per week must be increased proportionately.

STENOGRAPHY 1A (Pitman or Gregg)

This is an introductory course which has been planned to give the student a considerable amount of experience in the subject. It is partly a try-out course; and as such, it should provide both teacher and pupil with data which will have some predictive value.

Stenographic skill increases with the development of automatic writing response to sound. Hence the dictation method of presentation should be used from the beginning. Fluent reading should precede all writing. Very little time need be spent in expounding principles. Shorthand is a continual review; more than sixty per cent. of each period of instruction-time should be devoted to intelligent drill based on modern psychological principles. All reviews should be guided by the needs of students as indicated by diagnosis of test results. Reading, silent and oral, individual and choral, should form part of the daily lesson.

Requirements:

1. Intensive study of the textbook.
2. Ability to apply the principles of shorthand to the writing of about 2,000 "high-frequency" words.
3. Ability to read fluently from the textbook and easy supplementary material.
4. Ability to take dictation at the rate of from 40 to 50 words per minute on continuous matter having a syllabic intensity of not more than 1.4.

Textbooks:

Pitman Shorthand (Canadian Centennial Edition).
Gregg Shorthand Manual, Functional Method, Part 1.

References:

The Teaching of Shorthand: Educational Monograph (Gregg).
The Fourteen Points in Shorthand Teaching: Hagar (Gregg).
Functional Method Dictation: Teacher's Handbook (Gregg).
Methods of Teaching Shorthand: McNamara (Pitman).
Teacher's Manual: Newman (Pitman).
Pitman's *Shorthand Dictionary* (Pitman).
Pitman *Shorthand Readers* (Pitman).

Law

This course was formerly known as Commercial Law, but has now been extended to encompass some additional types of contact between the citizen in the ordinary course of his daily life and the law of the Province. This subject is now recognized as one of real worth to all students in that it is directly related to the principles of right and wrong as applied to business dealings and other common affairs of daily life.

The teacher in presenting the subject should avoid all strictly legal technicalities and adopt the attitude of the layman in all discussions on the problems studied.

Aims

1. To give the student a knowledge of his rights and obligations in common business transactions and ordinary affairs, and to help him, through this knowledge to avoid legal entanglements.
2. To develop the power to reason and exercise good judgment in the application of legal principles to business and private affairs.

3. To develop a wholesome appreciation of law as a social force, through the study of governmental agencies, and the associations of men for business purposes; for example, dominion and provincial commissions, the recording of legal papers, coinage, banks, insurance companies, common carriers, loan associations, partnerships and corporations.

4. To teach the use and purpose of certain common legal documents, such as negotiable instruments, bills of lading, deeds, mortgages, bills of sale and leases.

5. To develop precision of statement through careful analysis of a legal situation, logical thinking and sound reasoning.

SUGGESTIONS RE PROCEDURE

1. Before the teacher takes up the study of specific topics and the principles of law applicable thereto, the broad basis of law should receive consideration: the need for laws in our social and economic life, the protection of rights, the sources of law, methods of enforcing laws, and evidence of business ethics and moral obligations in business dealings.

A very brief historical introduction will suffice to make clear to the students the nature and origin of the corpus or body of law which governs them at the present time in the Province of Alberta. Reference might be made to The North-West Territories Act (R.S.C., Ch. 50, 1886), by section 11 of which it was provided that subject to the provisions of the Act the laws of Engalnd relating to civil and criminal matters, as the same existed on the fifteenth day of July, 1870, should be in force in the North-West Territories in so far as the same were applicable to the Territories and in so far as the same had not been, or were not thereafter, repealed, altered, varied, modified or affected by any Act of the Parliament of the United Kingdom applicable to the Territories, or of the Parliament of Canada, or by any Ordinance of the Lieutenant Governor in Council of the Territories or of the Legislative Assembly of the Territories. By Section 12 of the Act, it was further provided that all such laws should continue in force until the same were changed by statute. Reference should also be made to The British North America Act, 1867-1886, and also to The Alberta Act, which came into force on September 1, 1905.

In reference to the historical development it will be necessary to furnish students with some very elementary notions on such points as the following: written and unwritten law, the common law of England, common law and statute law, common law and equity. Reference to such matters as trusts, liens, mortgages, will afford illustrations of the manner in which the courts of equity were able to abate the rigours of the common law.

2. The principles of law should be presented by means of illustrative cases; moreover, these cases need not be cases taken from textbooks and reference books. They should be cases which are likely to occur in the students' local environment, and cases which are not too difficult or technical for high school students. No case should be discussed which does not illustrate an important principle of law. Special effort should be made to give this subject an application to everyday problems, such as are likely to occur in the lives of average citizens. Classroom instruction should give ample opportunity for the students to raise questions and to take part in discussion of principles and problems.

3. An attempt should also be made to study recent legislation; such as, The Farmers' Creditors Arrangement Act, The Debt Adjustment Act, The Revised Debt Adjustment Act and The Reduction of Debt Act and other Acts that may be effective from time to time. Copies of these Acts may be obtained from the King's Printer at a nominal cost.

Copies of the following should also be made available:

The Bills of Exchange Act, The Bank Act, The Partnership Act, The Companies Act (Alberta), The Companies Act (Dominion), The Bankruptcy Act, The Money-Lenders Act.

Topics for Problems and Cases

(i) The ownership of land, title to land and registration of title, transfer of ownership and title; leases, landlord and tenant, notice to vacate; mortgages and foreclosure; protection of an interest in land, caveat; taxes on real property.

(ii) Contracts—parol and written; consideration, fraud and misrepresentation; damages for breach of contract, specific performance; limitation of actions.

(iii) Negotiable instruments—note, cheque, draft, bill of exchange; banking, interest; insurance; principal and agent, sales, bailment, pledge and lien, guarantee and suretyship.

(iv) Common business forms:

Power of Attorney, Simple Contract, Lien Note, Instalment Note, etc.

(v) Partnership and companies—different types of company; bankruptcy.

(vi) Succession; wills.

(vii) Master and Servant; Workmens' Compensation.

(viii) Libel and slander.

(ix) Liability for accidents—traffic accidents; negligence; accident insurance.

(x) The courts of law and court procedures; police courts; civil and criminal law; the Criminal Code; crimes and misdemeanours.

(xi) The civil liberties of the subject: Habeas Corpus; freedom of speech and assembly; freedom of the press.

(xii) School law—The Alberta School Act.

Textbook:—*Manual of Canadian Business Law:* Falconbridge and Smith (Western Edition—Pitman).

Reference Books:—*Element of English Law:* Geldart (Butterworth).
Business Law: Walker (Ryerson).
Summary of Commercial Law: Anger (Pitman).

General Shop

N.B.—Outlines for the courses in shop subjects may be had in mimeographed form from the Department of Education on request. (Bulletin VI.)

INTRODUCTION

The subject of General Shop in the High School will follow the same general plan as was outlined for the Intermediate School. A wide range of options is provided for the school to offer, according to the requirements of its constituency and the financial ability of the district. The purpose of the course is to give a maximum amount of manipulative experience that may be useful in itself as the background for a tool-using trade, but that may be more valuable in satisfying the natural urge among many students to do things. Under the direction of a competent and wise teacher, there are very great educational possibilities inherent in this subject. By the time the student reaches the High School, cumulative personality and attainment records should indicate his inclinations and aptitudes. He may not be a scholastic type, properly appealed to through books or the class-room method of instruction, but he may show distinct ability in creative handwork. He may be inferior in written examination results, but superior in gradings for work done with his hands. By recognizing this ability and encouraging him, because of his success in making things, the whole tenor of his school life may be changed, and even his class work made much more satisfactory. By applying mathematics, science, history, drafting, to shop experiences, these subjects become more vital. In short, because of the interests developed within the student, he becomes more educable.

This course makes provision for varying abilities and experiences on the part of the student. One who has not had any previous experience may elect this option, in which case he will have to begin with the simpler projects, until it is clear he can profit from the more difficult. This must be left to the judgment of the instructor. For one who may have followed shop courses previously, the more difficult assignments or choices may be made.

There are no minimum requirements set out in this programme. The weaker student will be expected to work to his capacity. The more capable student will, in the same way, be required to work to his capacity. He will be expected to do more projects or more difficult projects.

The essence of the General Shop idea is individuality. Few subjects are more adaptable in catering to individual differences among students. Ideally, if an instructor could be secured, who was versatile enough, each student at the same time might work at a different project, using a different medium. Practically, the projects should be related closely to the student's personal interests, which should be the dominating influence in the choices made, subject to the ability of the student and the limitations of the shop, and always subject to the judgment of the instructor.

A daily log of the work done by each student should be kept. The taking of elaborate notes is discouraged, although there is a place for notes as a record of achievement and a concise statement of the thought processes involved. No project should be attempted without a shop

dimensioned sketch having been first prepared. These sketches should be carefully preserved, and with the note-book, made available for inspection. Great care should be taken by the instructor in having each student's plan for his project carefully scrutinized before he begins work. If this is not done, and projects are made which violate principles of good design, the shop is liable to fall into disrepute. The finished project will fail to please, no matter how careful the workmanship may be, unless the design of the project is good. This is fundamentally important. A finished model, to give the greatest satisfaction, must not only show good craftsmanship, but must be functionally fit, structurally sound, and artistically pleasing.

GENERAL SHOP 1

WOODWORK

There may be students, desiring to elect this option, who have had no previous training in the use of woodworking materials. This may be allowed, but, of course, such would necessarily have to be assigned projects of a more or less elementary nature. In a smaller school they might take projects outlined for a junior division with which probably they will be working. If they show ability, it might be wise to permit them to proceed with the work of this grade. If they do not show aptitude, weak or backward students should not be encouraged to seek credit in this grade.

The projects in this grade should be of a more advanced type, and might well involve the use of woodworking machinery. Hardwoods might be used for the cabinet work experience, and special attention might well be given to finishes. A boy who has had three years in woodworking might well be given work in building construction, that would make him intelligent in the building of a summer cabin, a garage, or an outhouse. He should know the principles of good construction; how to make window frames, and insert the windows properly; how to make a good door, and hang it properly. **Students may select two phases of the three outlined, which will constitute a full year's work.**

(a) Lumber.—Standard dimensions of common types, uses; grades of lumber, their uses; hardwoods available for furniture construction, costs, and economical use; estimates of costs of finished products in furniture, or in building construction. The use of the steel square.

Working drawings or plans will be necessary for all shop projects.

In cabinet work, fairly elaborate projects should be undertaken, subject to the approval of the instructor. The use of woodworking machines is encouraged. Design, finish, and decoration of the project are important, e.g., polishing, inlaying, carving.

Suggested projects; chesterfield or other table, gate-leg, end table, library table, radio case; piano bench; china cupboard; writing desk; hall stand.

(b) Wood-turning.

Simple spindle-turning and face-plate turning. At least **one** finished piece of work involving a major turning job should be turned out. Much practice work will precede the piece actually carried out.

Suggested models: floor lamp, table lamp, fruit bowl (decorated), table legs.

(c) Building Construction.

Group work in the building of a small building, e.g., dog kennel, child's play house, garage. Special attention will be given to roof construction, window framing, door construction, and stair building; the use of the steel square.

METAL

A student may take any **one** phase of this work, or a combination.

(a) Machine Shop.

The metal working experience in this phase will involve hand working, and machine tools. A screw cutting lathe, a grinder, and a drill press should be available for machine operations. A set of taps and dies is also essential in the interpretation of the course.

The following processes should be carried out: cutting, sawing, filing, drilling, countersinking, turning, squaring, parting, threading, and polishing.

Suggested projects: tool or drill gauge, clothes hanger, dovetail, screw clamp, tapered pein hammer, punch, machine bolt and nut, knife from an old file, set of spanners.

(b) Sheet Metal.

The development of surface; laying the pattern out on the metal itself.

Processes should involve cutting, folding and forming, rolling, burring and edging, fitting, mitre cutting, soldering.

Suggested projects: pint tin cup with handle, circular or semi-circular scoop, lampstand, urn, bowl.

Ornamental sheet metal, involving brass, aluminum, copper, hammering, fluting, polishing, raising, modelling, saw piercing, etching.

Suggested projects: ash trays, plates, plaques, medallions, trophy shields, ornaments.

(c) Forging.

The work of this unit will be a continuation of that of the previous grades. The student should proceed to more advanced problems, using the knowledge and skill acquired.

Suggested projects: a cold chisel, a rock drill, a camp cooking outfit, ornamental grill, hearth fenders, lamp bracket, business sign, umbrella stand, golf bag support, ornamental metal footstool.

ELECTRICITY

The purpose of this phase of General Shop is to provide manipulative experiences involving the use of the electric current with the minimum amount of theory. In the previous grades, a wide range of opportunity has been opened, which should give a basis for more advanced projects.

Suggested projects: the electric system in a motor car; dismantle and assemble on a suitable frame, to make clear all the parts, and their

arrangement; storage battery; dismantle and reconstruct, securing the necessary plates; construct and operate a telegraph system, learning the Morse and Continental codes; set up, connect a telephone system; build a wind electric generating system, using an automobile generator, and making the propeller; rewind a burned-out armature coil; construct a radio set, making the cabinet.

AUTOMOTIVES

The dismantling, reconditioning, and assembling of a motor car and a tractor.

This option should not be chosen unless there are facilities for properly housing such projects. The instructor must have experience with such work before it may be undertaken on the part of the students for credit purposes. Trestles may be built, and chain blocks, jacks, and tools, may be borrowed from the community. The projects may be similarly secured. Cylinder blocks may have to be sent out for reconditioning, and certain other specialized repairs made outside the school, but much of the work can be done in a satisfactory manner by boys of this grade.

The making of a trailer from a discarded motor car makes an excellent shop project.

FARM MECHANICS

At least **two** phases of this outline must be followed if credit is to be granted.

Woodwork (outdoor conveniences).

Study of plans or bulletins for the farmer, supplied from the Department of Agriculture, or elsewhere.

Suggested projects: chicken coop, chicken house, hog house, granary, garage, machine shed. Most of these buildings could be built on skids, and delivered, as finished. Local persons might supply lumber and use the finished product. Stock loaders, hand cultivators, and row markers for the garden make good projects.

Woodwork (indoor conveniences).

Step ladders, built-in cupboards, wardrobes, ironing cabinets, kitchen stools, flower stands.

Blacksmithing.

Make hooks, chains, clevises, gate hinges. Sharpen plough shares, cold chisels, drills.

Concrete.

Build more complicated wooden forms; re-inforce concrete with wire and rod; strengthen forms by wires and cleats; build watering troughs, well casings, gullies for stable, barn, or toilet. Smooth and decorate concrete surfaces.

Painting and Decorating.

The durability, resistance to weather and wear, sanitation, appropriateness, and economy of various finishes. The money-saving value of outdoor painting. Preparation for various finishes.

Application of paint, stain, varnish, calcimine. Patterns for sponge calcimining. Calcimine the school walls, surface and varnish desks, paint the school building or parts, or an adjoining home. Decorate the building, with approval of the School Board.

Working with Fabrics.

Make cushions, pillows, quilts, stockings, mitts, caps, shawls. Simple methods of upholstering footstools, chairs.

Harness Repairs.

Sew and rivet harness parts. Make bridles; splice leather lines, saddle straps, mattresses.

Upkeep of Farm Machinery.

Small repairs on binder, separator, plough, seeder, harrows. Study of the construction of farm machinery, by chart. How to secure best draft for a team of horses; gasoline engines—stationary, automobile, tractor.

Wickerwork.

Cure native willow for wickerwork; bark, grass, cleat, weaving, rustic work. Apply woven work to wooden frames, chairs, small tables, flower stands, verandah and garden furniture.

Recommended for use of Teachers:

General Shop Work: Ashcroft and Easton (Macmillan).
Problems for School and Home Workshop (Ryerson Press).

GENERAL SHOP 2

The majority of the boys in Grade XI will have had a fairly wide experience with the use of tools during the preceding four years. The necessity for using a variety of media will have passed so far as the majority in the class are conerned. They will have worked with various materials using various tools, and will, in all probability, have developed certain interests each will care to follow. This inclination should be honoured and major projects attempted, even if a project may occupy most of the time of the year. Effort should be made to give variety that all do not work on the same type of project. More costly material may be used without the danger of spoiling it and wasting money, and the finished articles should have enhanced value because of the skill of workmanship applied. There should be community projects undertaken for the school during the year that a boy does not develop a selfish attitude through making things exclusively for himself.

It is fair to expect that some fine work will be done in this grade. These are merely suggestive. It will be expected that the boy will be continuously and intensely occupied and that a daily log of achievement will be kept. This is important. Shop sketches or plans must be made and retained for inspection. Note books should contain a written analysis, with brief specifications or details of the work to be done. Good design and finish are fundamental.

Wood Work:—Articles of furniture, table, chair, dresser, chest, writing desk, radio cabinet, cupboard. Hardwood is to be preferred. Decoration of a suitable type should be included—carving, inlaying, molding,

or other surface decoration. Model airplane, model ship, oil derrick, coal tipple, house, building.

Metal Work:—Some major project involving the use of the lathe and metal working machines or forge, flat metal, copper, brass, pewter shaped and ornamented desk sets, plaques, lamp-shades, hanging lamps or ornaments; tinned, iron or galvanized iron or black iron ornaments—grills, gates, signs; gas engine; model steam engine; clock.

Electricity:—Model motors; radio; transformers; heating and household equipment; telephone or telegraph sets.

Gas Engines:—Overhaul of automobile engine, stationary engine, small diesel construction; building of an engine for driving a model airplane.

Plastics:—Preparation and use of papier mache or gesso for some large project such as topographical map to scale; clay or plasticene modelling of ornaments using mold gelatine or plaster; pottery, including the building of a simple kiln.

The student should investigate various types of project chosen for historical, commercial or special use, referring to library, catalogue and available examples. This necessitates the securing of a fairly comprehensive library and other reference material for the use of the shop.

ARTS AND CRAFTS

Because of the inclusive nature of this subject a student may desire to work at some major interest not suggested in any remarks herein included. Such individuality should be encouraged but the student should submit the details of his plan to the instructor for approval. This might include leather, glass, stone or alabaster work, sculpture, weaving, enamel work and jewelry, book-binding.

MECHANICAL DRAWING

Work in Mechanical Drawing will include the use of drafting equipment: T-square, set-square, scale, and instruments. A study to be made of geometric and projection drawing. A series of at least 30 plates, neatly drawn, should constitute a year's work—these to include: lettering, geometrical construction, conventions and symbols used in drafting, projection drawing (including hidden parts and sections, drawing to scale, and inking).

Textbook:—*Mechanical Drawing Phamphlets* Lessons 1-10 (inclusive): (Instruments and Materials: Lettering; Geometrical Definitions, Geometrical Problems I, II; Symbols—Dimensions—Inking a Drawing; Principles of the Working Drawing I, II, III, IV), by Tom C. Plumridge, James McKinney, and Ervin Kenison, American School, Chicago, Illinois.

Home Economics

INTRODUCTION

The programme in Home Economics is planned for those who will have had previous experience with this subject in the Intermediate School. It is quite expected, however, that there will be cases where students will desire to select this option without having had this previous training. This should be possible, in as much as the individual student has been kept uppermost in mind in the drafting of this programme; and a student without a previous course may be given essential experiences, where necessary, to enable her, without too serious loss of time, or other handicap, to take her place in the regular class.

The girl in the home is the central idea about which the details of the programme are gathered. This should be kept in mind at all times, and the actual conditions of life among girls in their homes should be always uppermost. The school is necessarily an artificial environment, and, unless the instruction can be made to carry over into practical situations, it will be of little value. While its main value may be utilitarian, still it has cultural and disciplinary values. Because of its inclusion on a programme of studies, many girls may be made more teachable in academic subjects. School is a more interesting place, and much of the subject matter of the class-room may be made more applicable to actual life situations. The subject has high correlating possibilities.

HOME ECONOMICS 1

It will be noted that no minimum requirements are specified. This omission implies a responsibility upon the instructor to see that an adequate quantity of work is done during the year by each individual, that will justify the awarding of a credit. While this judgment will necessarily be made by the instructor, it is still subject to the checking of the inspector. To facilitate this checking process, each student will keep a note-book in which will be recorded a dated account of each day's achievement. Projects need not necessarily be retained if their retention interferes with the maintenance of interest and effort; but, where practical, projects should be available for inspection. A detailed record of the work of each student will be reported on the proper forms for credit purposes at the end of the year.

The following analysis will indicate the approximate time that should be allotted to each phase of the subject:

Unit 1.—Foods	14 weeks.
Unit 2.—Clothing	14 weeks.
Unit 3.—Home Management	4 weeks.
Unit 4.—Budgeting	2 weeks.
Unit 5.—Personal Responsibility	2 weeks.

These units may be taken in any order, according to the discretion of the instructor. For Units 4 and 5, the work and discussions will be better handled by extending them over the year.

UNIT 1.—FOODS

Objectives:

To teach selection, cost, marketing, and preparation of foods on the meal basis, from the standpoint of health, economics, and art.

To develop an understanding of the scientific and economic principles underlying cooking and nutrition.

To develop an appreciation for proper organization and planning of housework, to save time and energy.

To develop a true spirit of hospitality.

Subject Matter:

Review simple dinners. Plan, prepare, and serve more formal dinners, to include: appetizers (fruit juices, fruit cups, canapes); soups; meats, fowl, fish, carving; salads; bread; biscuits, cheese straws; vegetables, less commonly used types, and variety in cooking common types; desserts—pastry, frozen, gelatin, steamed; deep fat frying.

Nutrition; digestion.

Cooking for children, aged persons, invalids, and convalescents.

UNIT 2.—CLOTHING

Appreciation of the value of careful grooming.
Understanding of the principles of good design as applied to clothing.
Ability to plan a suitable wardrobe.
Ability to make simple clothing.
Ability to choose suitable ready-to-wear clothing.

Discussions and Demonstrations:

Clothing survey; clothing budget—relate to family income; care of clothing—daily care, storing, cleaning, and pressing; principles of design and colour combinations.

Projects:

Select at least **one** from Group I, and at least **one** from Group II.

Group I.—Silk undergarment; nightgown; kimono; lounging robe; tailored pyjamas; shorts and blouse; slacks and blouse.

Group II.—Wool skirt and silk blouse; silk afternoon dress; evening dress.

Problems involved:—Selection of patterns, styles, and materials; design; colour; quality, and amount of material; some study of textile chosen for garment; trimming.

Construction:—Seams, stitches, plackets, finishes, etc., as necessary.

Cost:—Compare with ready-to-wear.

Accessories.

UNIT 3.—HOUSEHOLD MANAGEMENT

Problem:

Some girls have their own bedrooms, and others share their rooms. What special care do bedrooms require?

Objectives:

To give a clearer understanding of the girl's obligation as a member of the family; to share in the work of the home.

To develop appreciation of the comfort and pleasure to be derived from a clean, orderly house.

Topics for Discussion:

Purpose of personal room:—Bedroom, study; advantages in having own room privacy; responsibility in sharing room; furnishings for bedroom, and their selection; arrangement of bedroom furniture; qualities and kinds of bedding; use of colour in bedroom; possibilities of improving furnishings; care of bedroom and clothes closet—daily, weekly, occasional.

Project:

Plan a girl's room, simple in design, inexpensive in outlay. Work from pieces of furniture already on hand. Introduce one or more of the following improvements:—Curtains, bedspread, rug, dressing table from boxes, wall book-shelf, painting or refinishing old furniture, a study unit.

UNIT 4.—BUDGETING OF MONEY AND TIME

Problem:

How to get more satisfaction from money spent, and how to ensure an efficient and satisfactory day.

Objectives:

To get the most for one's money; the most for one's time; and the most for one's strength. To help the girl gain, by means of the clothing budget, a better understanding of the advantages of definite planning.

Discussions and Activities:

List activities which use time, money, or strength. Discuss relative importance to health, progress, improvement, etc. Recall previous experience, observation, or reading, in relation to budgets. List items commonly included in family expenditures. Estimate individual share of the family budget. Make inventory of clothes on hand. Avocational expenditures.

Projects:

Keep personal accounts for year. Make a time budget for a high school girl.

UNIT 5.—PERSONAL RESPONSIBILITY

Problem:

How can high school girls help to make their homes happier, and contribute to the betterment of society?

Objectives:

Appreciation of individual responsibility to the home, and to the community.

Topics for Discussion:

The 100 per cent. girl.—Personal characteristics that help in life work; that help make happiness; that help make a happy home. Ways that these characteristics are developed and strengthened.

TEXTBOOK

Jensen, Jensen & Ziller: *Fundamentals of Home Economics* (Macmillan).

REFERENCE BOOKS

Jensen, Jensen & Ziller: *Fundamentals of Home Economics* (Macmillan).
Lannan, McKay & Zuill: *The Family's Food* (Lippincott).
Bailey: *Foods—Preparation and Serving* (Webb Publishing Company).
Trilling, Williams & Reeves: *A Girl's Problems in Home Economics* (Lippincott).
Bailey: *Meal Planning* (Manual Arts Press).
Chambers: *Breakfasts, Luncheons, Dinners* (Boston Cooking School Magazine Company).
Hunter: *The Girl Today—The Woman Tomorrow* (Allyn & Bacon).
Graves & Ott: *Your Home and Family* (Little, Brown and Co.).
Jordan, Zeller & Brown: *Home and Family* (Macmillan).
Justin and Rust: *Home Living* (Lippincott).
Shultz: *Making Homes* (Appleton).
Trilling and Nicholas: *The Girl and Her Home* (Houghton-Mifflin).
Starrett: *The Charm of Fine Manners* (Lippincott).
Kaufman: *Teaching Problems in Home Economics* (Lippincott).
Van Gelder: *From Thimble to Gown* (Allyn and Bacon).
Pickens: *The Secrets of Distinctive Dress* (International Educational Publishing Company).
Rathbone & Tarpley: *Fabrics and Dress* (Houghton-Mifflin).
Denny: *Fabrics and How to Know Them* (Lippincott).
Everson: *Practical Sewing* (Ryerson).
Dyer: *Textile Fabrics* (Houghton-Mifflin).
Bush and Welbourne: *Design* (Little, Brown and Company).
Gillum: *Color and Design.*
Butterick: *Principles of Clothing Selection* (Macmillan).
Friend: *Earning and Spending the Family Income* (Appleton).
Friend and Shultz: *Junior Home Economics Units* (Appleton).

HOME ECONOMICS 2

During the previous four-year period various interests involved in home making have been developed. Experiences in food preparation have been had, and certain fundamentals in the economics of food have been learned.

By the time Grade XI is reached the student should have gained a fair proficiency with her needle in the making of her own clothing and keeping it attractive. She will have made several articles which make her room or her home more attractive. Her taste in the selection of a home, and in building it into an attractive place will have been developed. The use of certain household equipment, as labour-saving devices, has

been studied. The place of such equipment in a home with financial limitations will have been discussed. Social and family relations will have been discussed with the view to making her life happier and her relationships more acceptable.

For the fifth year this outline of studies, plans to bring to an issue the experience of the girl secured either in the school or in the home with the definite application of the skills and knowledge acquired to the making of home from small beginnings as though it were the personal problem of each girl. Whether she will be privileged to make a home for herself or not, she will have to assume responsibility to a degree for the furnishing and housekeeping of her own living quarters.

There is no definite requirement set out in this programme. The teacher, who will act as a director rather than a lecturer or a group instructor, will be the judge as to what a girl shall do and the part she will take in the little society of the class or the larger life of the school. Ideally there will be a few engaged in the kitchen part of the school home, another group in the living room section engaged in craft work, home decoration projects, clothing, the whole spirit being that of a home whose standards are just a little higher than the general average of the homes in the community. Projects that may be motivated with a direct use possibility should be encouraged. Projects that may be fitted into the life of the girl in her home should be sought, even if these involve team work; such as the making of bedspreads, bolsters, pillow slips, runners, curtains, ornaments, boudoir chests, overhauled furniture, rugs, and dressing table gadgets. Many of these things may be made very inexpensively but very prettily. There is no reason why the girls should not have a single kit of tools in the shop with which to reconstruct furniture or make essential frames, shelves or equipment.

A girl may choose to work on the A. B. C. or D section of the course, each of which will have equal credit. The measure of the amount of work done will be the ability of the girl working at a reasonable rate throughout the term.

A daily log of the achievement of each girl shall be kept. Each girl will be expected to work to her capacity and a high standard of attainment should be sought and maintained. Art principles should be carefully observed and applied in the projects worked out. This is necessary if the results of the class work are to bring the greatest satisfaction. Originality in design should be encouraged and local motifs sought about which to work artistic schemes. Colour harmonies are particularly important.

Projects should not necessarily be retained in the school although the maintenace of the school room as an attractive place should have the constructive interest of each girl. She should be required to take some major part in a community project and not be permitted to use her time exclusively in producing something for herself. It will be a desirable objective to dispose of the made projects at the close of the year that the next incoming class may have a clear course in working out their individuality.

The following suggestions are intended to give a lead as to what might be worked out during the year.

Section A:

The making of a home will be the main motive during the year.

The home site—location; building or renting a house; instalment buying for building or furnishing; insurance, services, grounds, garden, economics.

Home furnishing:—Furniture for various rooms; economy; equipment such as range and heating system, cooking equipment; food storage and preparation and serving; furnishings—floors, walls, windows, colour schemes, decorations, arrangement; library, books, periodicals, their use and care; housekeeping routine; housekeeping aids; help.

To as great an extent as possible the classroom should be made a home in which to work out through the project method class discussion. This offers great leeway for ingenuity.

Laundry and cleaning, dyeing, decorating fabrics.

Home craft—cross-stitch, petit point, weaving, cane and raffia, embroidery, rug making, quilting, batik, tie and dye, stick printing, stencilling; electricity—installing fuses; inserting washers in taps. The use of common tools, screw driver, plane, hammer, chisel, wrench. Actually make some project. Home ornaments, copper, leather, plastic resins.

Food menus and service:—Breakfasts, lunches, dinner, tea parties, special occasions, work or school lunches, picnic and outing menus.

Home relationships:—Conventions, understanding, compromises, entertainment, social responsibilities, insurance—fire, life, accident and health, burglary.

Home nursing and the care of invalids and children, diets and menus.

Clothing:—Garments, according to ability of girl; care of clothing, mending, remodelling, economics.

How to make a bed; care of bathroom and basins.

It will be desirable to have the class visited by men and women representing certain interests of value to girls. It would be well to inspect some well-set-up homes in the community as an object lesson. The whole spirit of the course should be that helpful to a young woman faced with the problem of setting up a home.

Section B.

SEWING

The desired outcome of this course is to aid a girl in making her own clothing economically, to buy suitable clothing economically, and to alter garments to get a good fit, and an attractive costume.

Patterns:—Commercial, altering, variety, skirt draft, collar draft, changing plain sleeve draft to fancy sleeve.

Textile:—Wool and silk, the source, manufacture (not in detail), finish, care of silk and wool, laundering, dry cleaning, purchasing and testing emphasized, comparative costs.

Colour and Design:—Line and design as applied to girl's own type; complete unit, shoes and hat; colour harmony in wardrobe and dress, related to girl personally; becoming hats, etc.

Construction:—Novelty seams added to first year's knowledge, faced hems, stitches—cross, faggot, hemming, smocking, bound buttonhole in wool, skirt placket, faced placket in silk, commercial finishes, pinking and shirring, simple ideas in tailoring.

Suggested Projects:—To meet girl's own need in silk or wool. Blouse, skirt, dress, tailored jacket, remodelled hat.

References:—Selected readings from books listed in Fabric and Dress Design Courses (Technical Subjects).

Lace:—Buying, judging, common laces.

Section C.

FOODS AND COOKERY

The object in this course is to develop skill in the preparation of foods in relation to the home and special hospitality occasions both within and without the home. An appreciation for proper organization and planning to save time and energy should result from this study. A student working with this option should develop skill and knowledge as to etiquette and proper serving methods.

The student may not cover all the details suggested here but will select or be assigned to those that require enough time to secure four credits. It is strongly urged that this programme be worked out by having the girls working in groups, different projects being covered by different groups working at the same time.

Selection will be made among the following laboratory suggestions.

Menus for breakfast, lunch, dinner—prepared and served; afternoon tea, evening party supper, Sunday evening supper, serve-yourself meal, after-sport party supper, breakfast party supper, picnic, school or work lunch.

Practical work in **table service and setting,** use of left-overs, buying, keeping account of time and money used in securing, caring for, and the preparing and serving food.

Preservation of food, salting, drying, refrigeration, canning, jellies, pickling.

Special diets—anti-constipation; reducing and fattening; invalid and children's.

Section D.

CRAFT AND HAND NEEDLE WORK

The following are suggestions as to craft problems that may be attempted. It is not intended that every student will work at all these problems. It is expected that different students will be working at different problems at the same time.

1. Girls' Room

Remodelled furniture, redecorated furniture; curtains, bedspreads and quilting, cushions, dressing tables and decorations, novelty lamps, framed pictures, chests, pillow cases, dresser covers, weaving, rugs.

2. Sewing Room

Lampshades, book ends, copper ornaments, soapstone or alabaster ornaments polished; curtains, rugs, chesterfield covers, runners, upholstery.

3. Bed Sitting Room

Slip covers, book cases, chests, spinning, batik, petit point, embroidery, cross-stitch, applique, weaving, felt applique. Leather tooling, raffia and reed basketry, knitting.

The girls in selecting this option should have at their disposal a simple kit of wood working tools and a painting outfit.

NEEDLEWORK

Under certain conditions it may not be possible to offer the full Home Economics course, particularly the foods section; but it may be feasible to do some work in Sewing with the girls. These conditions are more likely to occur in rural or smaller urban schools, where the class may be small and the facilities limited. The organization of a hand needlework class is simple; and the necessary equipment is not elaborate, being little more than a thimble, a needle and some thread. The student's desk may be the work table and the materials with which to work may be brought from home. Boys may be interested in certain types of needlework.

While no minimum requirements are set out in the course, the teacher will be held responsible for seeing that a reasonable amount of sewing is accomplished. Each student will be required to work to her capacity, and her final grading will be determined in terms of what is actually achieved in relation to her ability.

The teacher will be the judge as to the assignments any student may be given.

A carefully kept note-book is essential for each pupil, but this should not be stressed at the expense of actual achievement. Samples of work in textiles, colour schemes, pictures and clippings are properly included in the note-book, but even this may be overdone. This book should be available to the inspector, who will give it careful consideration in evaluating the status of the pupil and the type of work being done in the class.

A daily diary, record or log shall be kept in a separate section of the note-book.

Provision should be made for a reference library, which should be readily accessible to the pupils. Assignments should be made frequently which call for the use of the reference library.

The nature of the fabrics used will be studied with respect to type of fibre—cotton, linen, silk or rayon; weave, qualities, and servicability for the purposes designed. This work should be done incidentally when these fabrics are being used.

A. Construct and decorate some household article, such as towel, pillow slip, sewing bag, shopping bag, laundry bag, knitting bag, chesterfield set, using various sewing stitches; such as basting, hemming, overhanding, overcasting, running, backstitching, where strength is required; and decorative stitches, such as outline stitch, chain stitch, blanket stitch, hemstitch, cross-stitch, button-hole stitch as for scallops, satin stitch.

B. Construct and decorate with the use of a pattern some simple garment, such as apron, slip, pyjama set. Embroider or applique a monogram or a simple pattern, using colour.

With the use of a pattern construct a simple blouse, or house dress.

These garment problems will involve simple construction processes such as the making of collars, cuffs, plackets, button-holes; and attaching fasteners, such as buttons, hooks and eyes and dome fasteners.

C. Needlecraft—knitting, quilting, cutwork, drawn work, crocheting, needlepoint, cross-stitch, weaving (weave-it "loom") as applied to some useful article.

Requirement.

At least two articles must be completed, one from "B" and one from "A" or "C". This requirement is the minimum. The capable student may achieve more—one article from each group, or even more.

Care and repair of textile articles. Mending, patching, and darning; laundering; removal of spots and stains.

Reference Books.

1. Practical Sewing—Everson—Ryerson Press.
2. From Thimble to Gown—Van Gilder—Allyn & Bacon.
3. Clothing for the High School Girl—Boldt & Harkness Lippincott.
4. Textiles—Nystrom—D. Appleton & Co.
5. The Mode in Dress and Home—Donovan—Allyn & Bacon.
6. Fabrics and Dress—Rathbone & Tarpley—Houghton-Mifflin.
7. Art in Everyday Life—Goldstein—MacMillan.
8. Textile Fabrics—Elizabeth Dyer—Houghton-Mifflin.
9. Samplers and Stitches—Handbook of Embroidery—Christie—Batsford.
10. Making Smart Clothes—Modern Methods in Cutting, Fitting and Finishing—Butterick.
11. Simplicity Sewing Book and Charts—419 4th Ave. West, New York.
12. McCall's Patterns—Manual of Instruction—Toronto.
13. Butterick Patterns—Manual of Instruction—Toronto.
14. White Sewing Machine Course in Dressmaking—White Sewing Machine Co.—Cleveland, Ohio.
15. Singer Sewing Machine Manual—Singer Sewing Machine Co.

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